$\Rightarrow p(R) = p(R/A) \cdot p(A) + (1 - p(A))$

$\Rightarrow \frac{4}{5} = \frac{1}{3} p(A) + 1 - p(A)$

$\Rightarrow -\frac{1}{5} = -\frac{2}{3} p(A)$

$\Rightarrow \boxed{p(A) = \frac{3}{10}}$ $\left(p(\bar{A}) = \frac{7}{10}\right)$

2) $p(A/R) = \frac{p(A \cap R)}{p(R)}$

$= \frac{p(R/A) \cdot p(A)}{p(R)}$

$= \frac{\frac{1}{3} \times \frac{3}{10}}{\frac{4}{5}} = \boxed{\frac{1}{8}}$